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TOWN OF STONEY CREEK

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GOVERNMENT DOCUMENTS

PUBLIC TRANSIT INVESTIGATION

MAY, 1978

De Leuw Cather CONSULTING ENGINEERS AND PLANNERS

De Leuw Cather Engineering Ltd.

CONSULTING ENGINEERS AND PLANNERS

May 9, 1978

Councillor F. Lintack, Chairman, and
Members of the Technical Advisory Committee,
Public Transit Investigation,
Town of Stoney Creek,
777 Highway No. 8,
FRUITLAND, Ontario,
L0R 1L0.

Madam and Gentlemen:

Re: Public Transit Investigation

The accompanying report is submitted in accordance with our agreement with the Town of Stoney Creek, dated July 26, 1977.

The report outlines our assessment of the potential areas for improvement in transit service. Our recommendations include adjustments in the routing system, service and fare policies, and a staged implementation program. The effects of the proposals on passengers, revenues and costs are provided. We are confident the recommended modifications will result in an overall improvement in the level of service consistent with community objectives.

The co-operation and assistance provided throughout the project by the members of the Technical Advisory Committee, the Hamilton Street Railway and the technical departments of the Town has been very much appreciated. We are available as appropriate to assist in the implementation of the detailed improvements.

Yours very truly,

DE LEUW CATHER ENGINEERING LTD.

Dale Turvey.

D. Turvey, P.Eng.,
Manager, Hamilton Operations.

DT:mc

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1. SUMMARY

This report outlines the findings of the Town of Stoney Creek Transit Investigation. The objectives of this analysis were as follows:

- to establish a basic bus transit routing system within the Town based on the expected 5-year growth and development; and
- to identify an immediate implementation scheme which will be compatible with a 5-year routing system and which is consistent with the needs and financial capabilities of the Town.

1.1 SCOPE OF THE INVESTIGATION

The investigation focused on the public transportation requirements within the Town given the expected 5-year development scheduling. It is intended as a comprehensive assessment of the role of public transit designed to develop a program of immediate action to improve the effectiveness of transit service. The investigation includes the following:

- Service and Fare Policies
- Routes and Schedules
- Implementation Program

Each of these aspects is dealt with in this report. Supporting technical material is contained in the interim reports submitted to and approved by the Advisory Committee during the course of the project.

1.2 ORGANIZATION AND GENERAL APPROACH

The project was managed by an Advisory Committee which included members of the Public Works Committee and staff members from the Town of Stoney Creek, the Region, the Hamilton Street Railway Company, and the Ministry of Transportation and Communications.

The project was carried out by a process which became successively more detailed as feasible alternatives were identified. Initially, the present services were evaluated on the basis of desirable urban transit standards and an on-bus passenger survey to identify current and future deficiencies.

Optional transit networks were developed and evaluated to select the desirable routing and service schedules to adequately meet the public transit needs of the community. Once the 5-year routing system was established, an immediate action program was developed in the final phase of the project.

The analysis was carried out in close consultation with the local elected representatives, the Town Engineer, the staff of the Hamilton Street Railway Company, and the staff of the Ministry of Transportation and Communications.

Assumptions related to the future residential development and the associated road network improvements were based on the information received from the Planning and Engineering Departments of the Town of Stoney Creek.

Public comment was encouraged throughout the project principally as a result of the on-bus passenger survey and news releases carried by both local newspapers.

1.3 THE REPORT

The findings and conclusions listed in Table 1 are expanded upon in the remainder of this section. Section 2 describes the expected growth within the 5-year planning period and present transit services operated within Stoney Creek. Section 3 outlines the suggested service and fare policies used to assist in the development of the service options. The adequacy of the present services is assessed in Section 4, and the options considered to improve the effectiveness of the present system are described in Section 5. The report concludes in Section 6 with a description of the selected service option and the suggested implementation program.

1.4 FINDINGS OF THE INVESTIGATION

Specific recommendations, together with the action required and estimated cost, where applicable, are summarized in Table 1. The items included are expanded upon in the remainder of this section.

Service and Fare Policies

Policies for transit service are required to guide and control transit operation and development. The suggested policies related to minimum hours and frequencies of service, route coverage, and transfers will provide a good quality transit service for the residents of Stoney Creek within the existing and proposed urbanized area. We recommend that the policies outlined in Section 3 of this report be adopted to provide sound guidelines for the provision of transit services in Stoney Creek.

Immediate decisions are required related to the fare structure to be established for use of the transit system and to the method of apportioning the municipal support for transit services to the residents of the Town. Since it is important to achieve integration with the total Regional transit system, the fare structure established should be compatible and consistent with the fare structure in force in the remainder of the system. In establishing the deficit allocation formula, major considerations include the ease of administering and applying the formula and its flexibility to accommodate expansion of the service in the immediate future.

Routes and Schedules - 5-Year Planning Period

The assessment of the adequacy of the existing transit service based on the suggested minimum service policies and the results of the bus-passenger survey indicated the following major areas for improvement:

- the services provided on the individual routes are not uniform and do not meet the minimum suggested hours and frequency of service;
- accessibility to transit is poor and will become more deficient as further residential development takes place;
- the directness of routing can be improved to the major activity areas within and adjacent to the Town;
- as the destinations of the majority of transit users are within the City of Hamilton, the transit system operated within Stoney Creek should be fully integrated with H.S.R. services and the travel time from Stoney Creek into Hamilton should be minimized; and
- the route pattern should be focused on one major area to ensure convenient transfers with the local and Regional transit services.

Alternative routing and scheduling concepts were developed to accommodate the expected development within the 5-year planning period, incorporating features of service to overcome the shortcomings identified. The evaluation of the optional routing proposals resulted in the following recommendations:

- within the urbanized area of the Town, located below the Escarpment, provide a system of three transit routes principally focused on Eastgate Square. Limited service would be maintained along Barton Street and the North Service Road east of Fruitland Road. Adequate service is provided by the C.C.L. inter-regional routes along Queenston Road east of Fruitland Road.
- within the Saltfleet Community, operate a "Stub" route service connecting to the H.S.R. Parkdale and H.S.R. Upper Kenilworth routes.

The recommended routings are described in Table 2 and illustrated in Figures 1 and 2. The estimated costs, revenues, and municipal support for the recommended service are outlined in Table 3.

Table 1

SUMMARY OF RECOMMENDATIONS

	Item	Required Action	Estimated Cost
1.	adopt minimum service policies as a guideline for development and control of transit service including: - minimum hours of service - minimum frequency of service - route coverage - transfers	formal adoption by Council	reflected in suggested service
2.	establish fare structure indicating support for regular passengers, students and senior citizens	formal adoption by Council and application to Regional Transit Commission	not applicable
3.	establish method of apportioning municipal support	formal adoption by Council	not applicable
4.	approve suggested 5-year transit plan to guide complementary land use development and road improvement priorities	formal adoption by Council	not applicable
5.	approve immediate action program including:	approval of budget by Council and make application to Regional Transit Commission	
	- routes and schedules		- $65,000
	- initial start-up costs		- $35,000
	- road construction in Saltfleet Community		- $50,000

Table 2

BASIC SERVICE CHARACTERISTICS - SELECTED SERVICE -
5-YEAR PLANNING PERIOD

	Route	Round-Trip Mileage Peak	Round-Trip Mileage Off-Peak	Frequency of Service (Minutes) Peak	Frequency of Service (Minutes) Off-Peak	Vehicles Required Peak	Vehicles Required Off-Peak
1	Millen Rd. - Queenston Rd.	13.2	13.2	15	30	4	2
2	Mohawk	19.8	6.5	15	30	6	1
3	Lakeshore	7.3	7.3	30	30	1	1
4	Barton - North Service Rd.	26.9				3 trips per day	
5	Saltfleet Community	6.1	6.1	30	30	1	1

Table 3

SUMMARY OF ESTIMATED COSTS, REVENUES AND DEFICIT SHARING - SUGGESTED SCHEME

Description: the routes and schedules as illustrated in Figure 1 in combination with a "Stub" route (Figure 2) providing a 30-minute service during the total period of operation

	Existing	Suggested
. Annual Revenue Miles	219,400	356,600
. Annual Cost	$435,000	$677,600
. Annual Revenue	$150,300	$268,000
. Annual Deficit	$284,700	$409,600
. Annual Subsidy	$ 76,700	$118,600
. Total Annual Support	$208,000	$291,000
- City of Hamilton	$ 55,400	$ 43,800
- Town of Stoney Creek	$152,600	$247,200
. Average Cost per Resident* of Stoney Creek	$6.70	$8.00

*Based on an existing urbanized population of 22,800 and an urbanized population of 30,900 within the planning period

Note: The costs and revenues given do not assume any allowance for possible deficit allocation to Stoney Creek for the King Trolley. In the opinion of the Committee, this is a realistic assumption.

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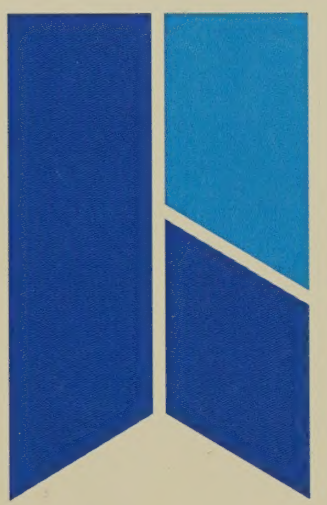

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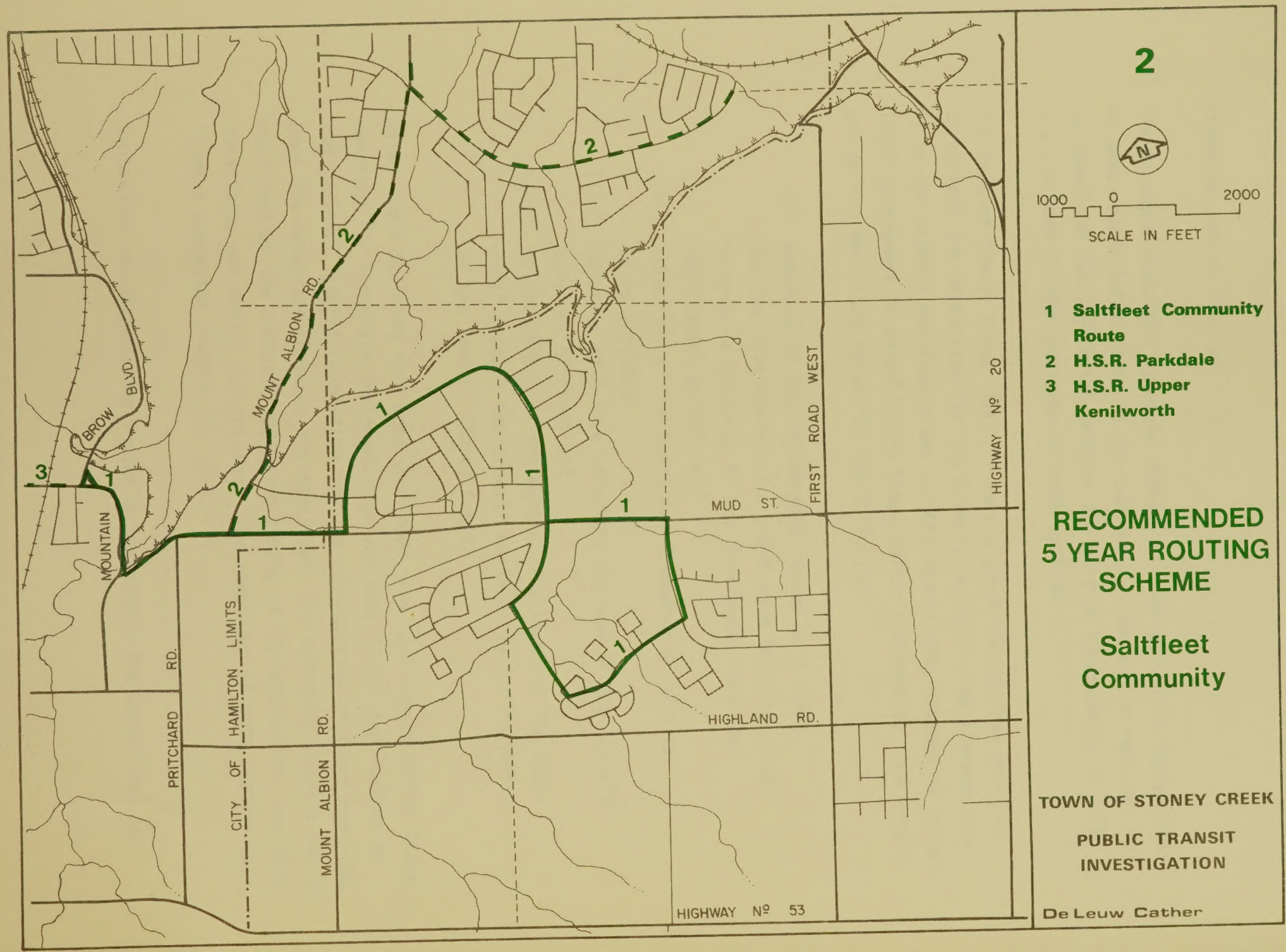
2
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SCALE IN FEET
1 Saltfleet Community Route
2 H.S.R. Parkdale
3 H.S.R. Upper Kenilworth
RECOMMENDED 5 YEAR ROUTING SCHEME
Saltfleet Community
TOWN OF STONEY CREEK
PUBLIC TRANSIT INVESTIGATION
De Leuw Cather
BROW BLVD.
MOUNT ALBION RD.
MOUNTAIN
PRITCHARD RD.
CITY OF HAMILTON LIMITS
MOUNT ALBION RD.
MUD ST.
FIRST ROAD WEST
HIGHWAY Nº 20
HIGHLAND RD.
HIGHWAY Nº 53

Immediate Action Program

The proposed route and schedule changes will be gradually implemented as development takes place in the community. The action required and an immediate implementation program for service adjustments in 1978 are outlined in the remainder of this section.

The Town of Stoney Creek should formally adopt the desired policies to achieve the objectives for the transit service. The minimum policies for transit services given in this report are intended to assist local government in establishing these policy statements. The principal policy decisions relate to the following:

(i) adoption of the recommended routes as a basis for the development of a short-term transit system to provide guidance in the development and road improvement priorities;

(ii) selection of the hours and frequency of service to be provided;

(iii) adoption of a fare structure for use of the transit services offered; and

(iv) establishment of the method of allocating the municipal support for transit services to the residents of the Town of Stoney Creek.

After these policies have been confirmed, the Town should select those services for immediate implementation and make formal application to the Regional Transit Commission for the introduction of these services. Once the requested services are specified, the operating details can be confirmed by the operator regarding timing of implementation, bus stop locations, and public information. The remainder of this section outlines a suggested program for 1978 - 79.

Initially, we suggest four routes be operated. The Consultant has

held discussions with the management of the Hamilton Street Railway Company regarding the feasibility of implementing these routes and has been assured that the routing, costs and timing of implementation outlined are realistic.

The initial routings proposed are described below and are illustrated in Figures 3 and 4.

(i) Millen Road route - this route extends from Eastgate Square south along Centennial Parkway to King Street, east along King Street to Millen Road and returning to Queenston Road via Millen Road, Royce Avenue and Kilbourne Avenue. During the off-peak period, this route would be interconnected with the Mohawk route.

(ii) Mohawk route - this route extends from Eastgate Square east along Queenston Road to Gray's Road, north on Gray's Road to Cedardale, east on Cedardale to Green Road, north on Green Road to Hemlock Avenue, east on Hemlock Avenue to Millen Road, south on Millen Road to Red Oak Avenue, north on MacIntosh Drive to Puritan Street to Barton Street, terminating at Mohawk College. During the morning and evening peak periods, the route would originate from Mohawk College and would operate "limited stop" between Eastgate Square and the downtown bus terminal similar to the present C.C.L. operation. During the off-peak period, this route would be interconnected with the Millen Road route.

(iii) Saltfleet Community - this route would extend east from the present terminus of the H.S.R. Upper Kenilworth route at Mountain Brow Boulevard and Limeridge Road along Mountain Brow Boulevard and Mud

Street to Paramount Drive, south on Paramount Drive to the proposed road connection to Gordon Drummond Avenue, along Gordon Drummond Avenue to Sir Isaac Brock Drive, south on Sir Isaac Brock Drive to 1st Road West, and return to Sir Isaac Brock Drive via 1st Road West and John Murray Street.

(iv) Barton and North Service Road - this route would originate at the Hamilton Terminal and proceed east along Barton Street to Fifty Road, north on Fifty Road to the North Service Road to Gray's Road, south on Gray's Road to Barton Street and return to the Hamilton Terminal. Five round-trips per day would be provided on this route. The direction of the looping may require changing during the day depending on the passenger loadings.

The following frequency of service and hours of operation are suggested and have been assumed in preparing the cost estimates:

Route	Route Length (miles)	Frequency of Service		Hours of Operation
		Peak	Off-Peak	
Millen Road	6.7	20	30	12 hours Monday - Saturday
Mohawk	17.9 (peak) 6.9 (off-peak)	20	30	12 hours Monday - Saturday
Saltfleet Community	6.3	30	30	12 hours Monday - Saturday
Barton St. - North Service Rd.	26.9			5 trips per day

The estimated total system operating costs, passenger revenue and deficits are summarized below. The costs were estimated based on 1977 unit costs.

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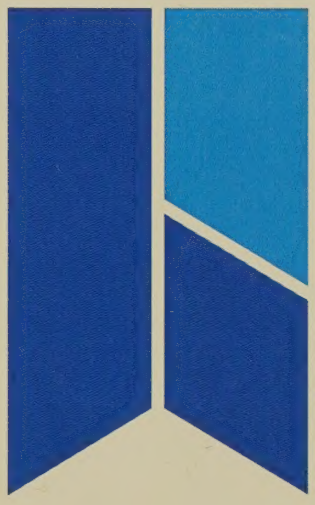

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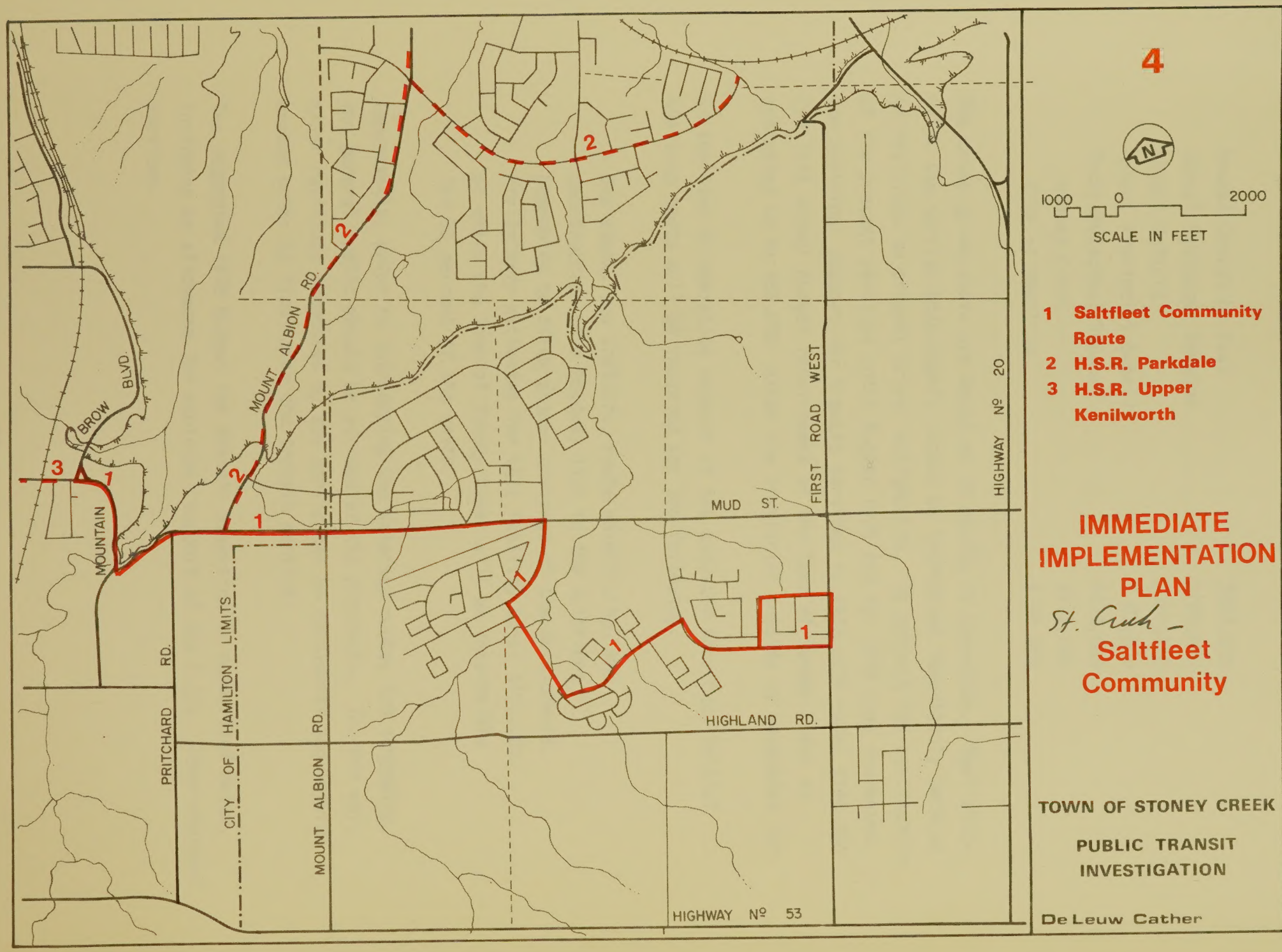
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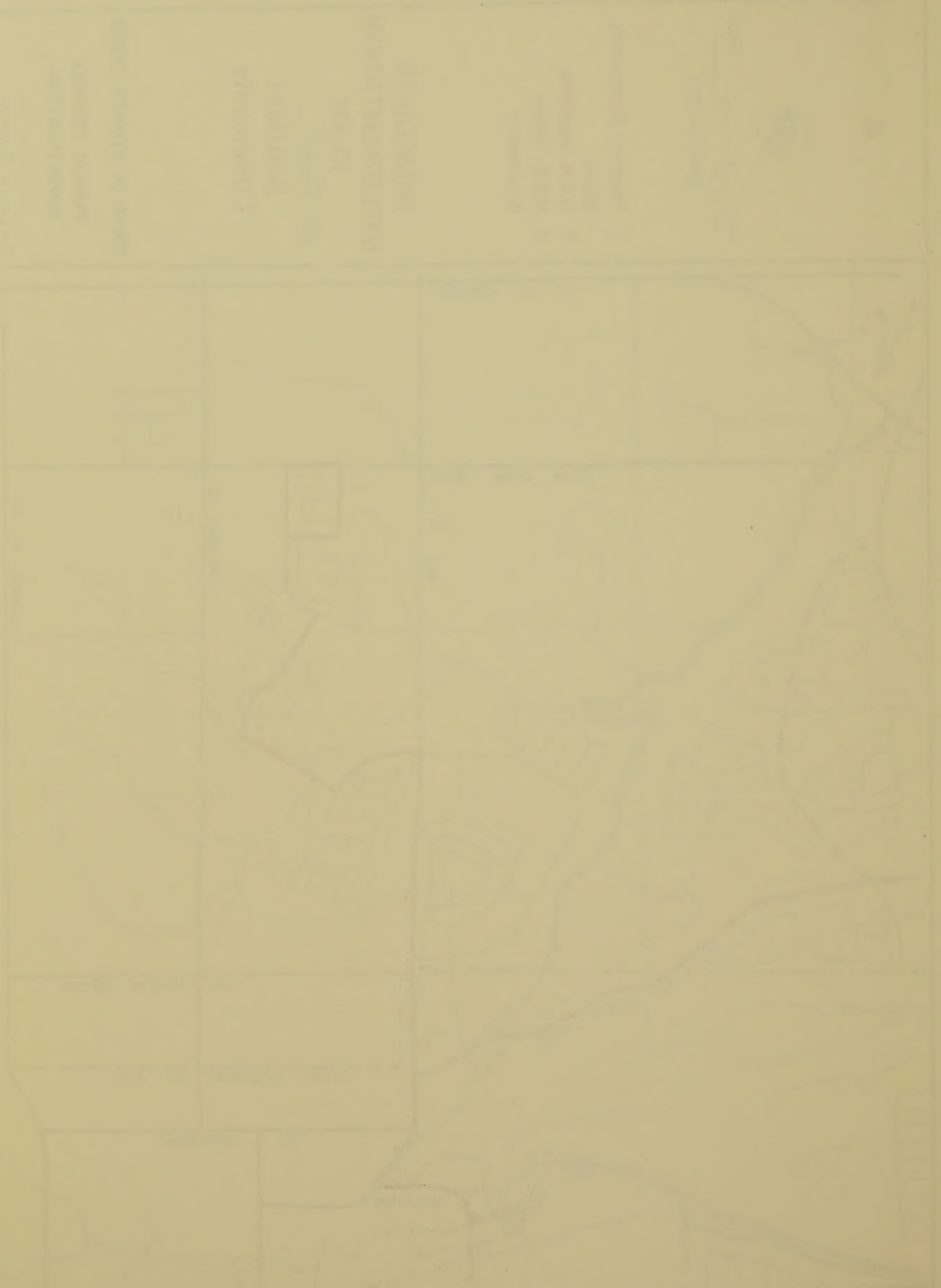
SCALE IN FEET
1 Saltfleet Community Route
2 H.S.R. Parkdale
3 H.S.R. Upper Kenilworth
IMMEDIATE IMPLEMENTATION PLAN
St. Gash - Saltfleet Community
TOWN OF STONEY CREEK
PUBLIC TRANSIT INVESTIGATION
De Leuw Cather
BROW BLVD.
MOUNT ALBION RD.
MOUNTAIN
PRITCHARD RD.
CITY OF HAMILTON LIMITS
MOUNT ALBION RD.
MUD ST.
FIRST ROAD WEST
HIGHWAY Nº 20
HIGHLAND RD.
HIGHWAY Nº 53



Annual Operating Cost	$500,000
Annual Passenger Revenue	$180,000
Annual Deficit	$320,000
Annual Provincial Subsidy	$ 87,000
Total Municipal Support	$233,000
Stoney Creek	$213,000
City of Hamilton	$ 20,000

The costs given above are based on 12 months of operation. Realistically, the service adjustments cannot be introduced immediately because of revisions to present driver assignments. To account for continuance of the present services until August 1978 and for 1978 cost increases, the municipal support for transit services in 1978 will total $195,000. The 1978 actual budget requirement of the Town of Stoney Creek is estimated to be $65,000. after the provincial subsidy is accounted for.

In addition to operating support of the adjusted services, initial start-up costs will be incurred for the following:

- bus stops, bus shelters, route advertising, and
- construction of a roadway link in the Saltfleet Community to allow proper coverage of the development. Preliminary estimates for this facility total $100,000. of which the Town of Stoney Creek will be responsible for 50 percent of the costs.

Importantly, prior to introducing the selected routes and schedules, the general public should be advised of the proposals. In this way, minor revisions requested by the public can be considered and incorporated prior to finalizing the transit service.

The suggested 1978 budget for transit operation is summarized below, including an allowance for municipal support of the C.C.L. inter-regional services.

- local transit operating subsidy with 80 percent provincial grant accounted for	$ 65,000.
- inter-regional transit subsidy from the Town of Stoney Creek	$ 40,000.
- initial start-up costs, including road facility construction in Saltfleet Community	$ 85,000.
Total	$190,000.

2. URBAN DEVELOPMENT AND EXISTING TRANSIT SERVICES

This section of the report includes a description of the planned development within the Town during the planning period and outlines the transit services operated.

2.1 URBAN DEVELOPMENT

The location and distribution of the residential and employment areas govern the requirements for transit services. The present and anticipated land use is outlined in Table 4.

The 1976 population totaled 30,400 residents within the Town of Stoney Creek. Within the 5-year planning period, the population is expected to increase to 38,500. The development within the Town of Stoney Creek can be broadly separated into the following three areas:

urban area: below the Escarpment, between the west limits of the Town and Fruitland Road, and above the Escarpment within the area bounded by Mount Albion Road, the Escarpment, First Road West, and Highland Road. The 1976 population of this area represents 75 percent of the total population of the Town. It is expected 80 percent of the total population will be in this area by the end of the 5-year planning period.

semi-urban: below the Escarpment, between Fruitland Road and the east limits of the Town. The 1976 population of this area is approximately 11 percent of the total population.

rural: above the Escarpment within the area bounded by First Road West, the Escarpment, the south

and east limits of the municipality. This area contains 14 percent of the total population.

The 1976 and planned population for each of these areas is summarized in Table 4. The planned growth will be focused in the area below the Escarpment between Millen Road and Fruitland Road and within the Saltfleet Community. No population growth is forecast within the semi-urban and rural areas.

Total employment in 1971 was 6,845 jobs. Of this total, 3,670 jobs were located in the area bounded by Gray's Road, Barton Street, DeWitt Road, and the Q.E.W. A further 1,670 jobs were located east of DeWitt Road and north of the Escarpment. The third major employment area is located in the commercial area along King Street of the Former Town of Stoney Creek. Estimated employment in this area was 600 jobs. These three employment areas comprise approximately 90 percent of the total. The remainder of the employment is scattered throughout the residential areas.

The distribution of population, employment and activity centres govern the routing and scheduling of transit services. As much as possible, the transit routes should focus on the major activity centres.

Given its location adjacent to a large urban community, Stoney Creek cannot be considered a free-standing community in a transportation sense. Residents commute daily to work in Hamilton, to the major shopping and commercial areas, and the educational institutions. Similarly, but to a lesser degree, Hamilton residents commute into Stoney Creek. The major conclusion related to transit services is to provide integration with the transit routes in the City of Hamilton.

The distribution of population results in different requirements for transit service. The urban area defined is capable of supporting regular transit service. The semi-urban area, being more sparsely populated, can only support limited service. In the rural area, transit service is not warranted because of the low population density.

Table 4

POPULATION DISTRIBUTION

Urban Neighbourhood	Population 1976	Population 5-Year Planning Period
Former Town	8,600	8,700
Eastdale	2,660	2,890
Corman	2,680	2,900
Poplar Park	1,230	1,760
South Meadow	1,310	1,700
Lakeshore	340	2,030
Guernsey	770	2,000
Highway Valley	770	1,350
Brentwood	1,370	1,370
Bayview	335	380
Westmeria	310	590
DeWitt	40	680
Albion	70	1,070
Valley Park	130	1,150
Felker	1,460	1,600
Trinity	210	210
Highland	520	520
Sub-Total	22,800	30,900
Semi-Urban Area:	3,300	3,300
Rural Area:	4,300	4,300
TOTAL	30,400	38,500

The road pattern and the streets over which buses are allowed to operate greatly affect efficiency. Good accessibility to transit routes encourages higher ridership. However, to allow this level of accessibility requires a reasonably continuous collector road system within the residential cells. The neighbourhood cells formed by the major north - south and east - west roads are approximately 3,500 feet by 2,800 feet. Desirably, residents should be within 1,000 feet of a bus stop. Therefore, in order to provide this accessibility, the buses must operate inside these land cells.

2.2 EXISTING TRANSIT SERVICES

Bus transit services in the Town of Stoney Creek are operated by the Hamilton Street Railway Company and the Canada Coach Lines. The existing routes are illustrated in Figures 5 and 6. The system operating statistics for 1977 are summarized below:

Existing Transit Services - 1977

. Annual Revenue Miles	219,400
. Annual Cost	$435,000
. Annual Passenger Revenue	$150,300
. Annual Deficit	$284,700
. Annual Provincial Subsidy	$ 76,700
. Total Annual Support	$208,000
- Town of Stoney Creek	$152,600
- City of Hamilton	$ 55,400

In general, the present bus routes are extensions of the H.S.R. and C.C.L. services focused on the central area of Hamilton. Three different types of routes are operated. Regular urban transit operation is provided on the Delaware Stub route, the Centennial Parkway route, and the Saltfleet Community route. Peak period express services are provided by the local C.C.L. routes principally focused along King Street between Centennial Parkway and Gray's Road, and along Barton

Street to Mohawk College. In addition to the above services, approximately 12 daily trips are operated along Queenston Road by the C.C.L. inter-regional system.

The schedules operated on each route vary in terms of hours of operation and frequency of service. Service and ridership data for each route are compared in Table 5. Further detail regarding the operating statistics of the existing services is provided in Interim Report 1 - INVENTORY OF EXISTING SERVICES.

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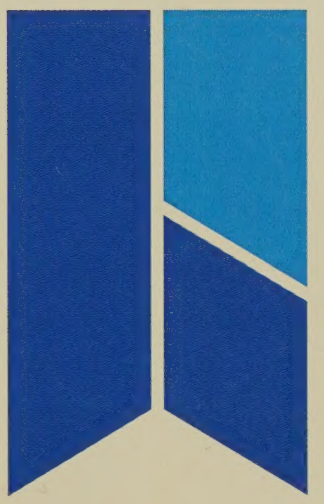

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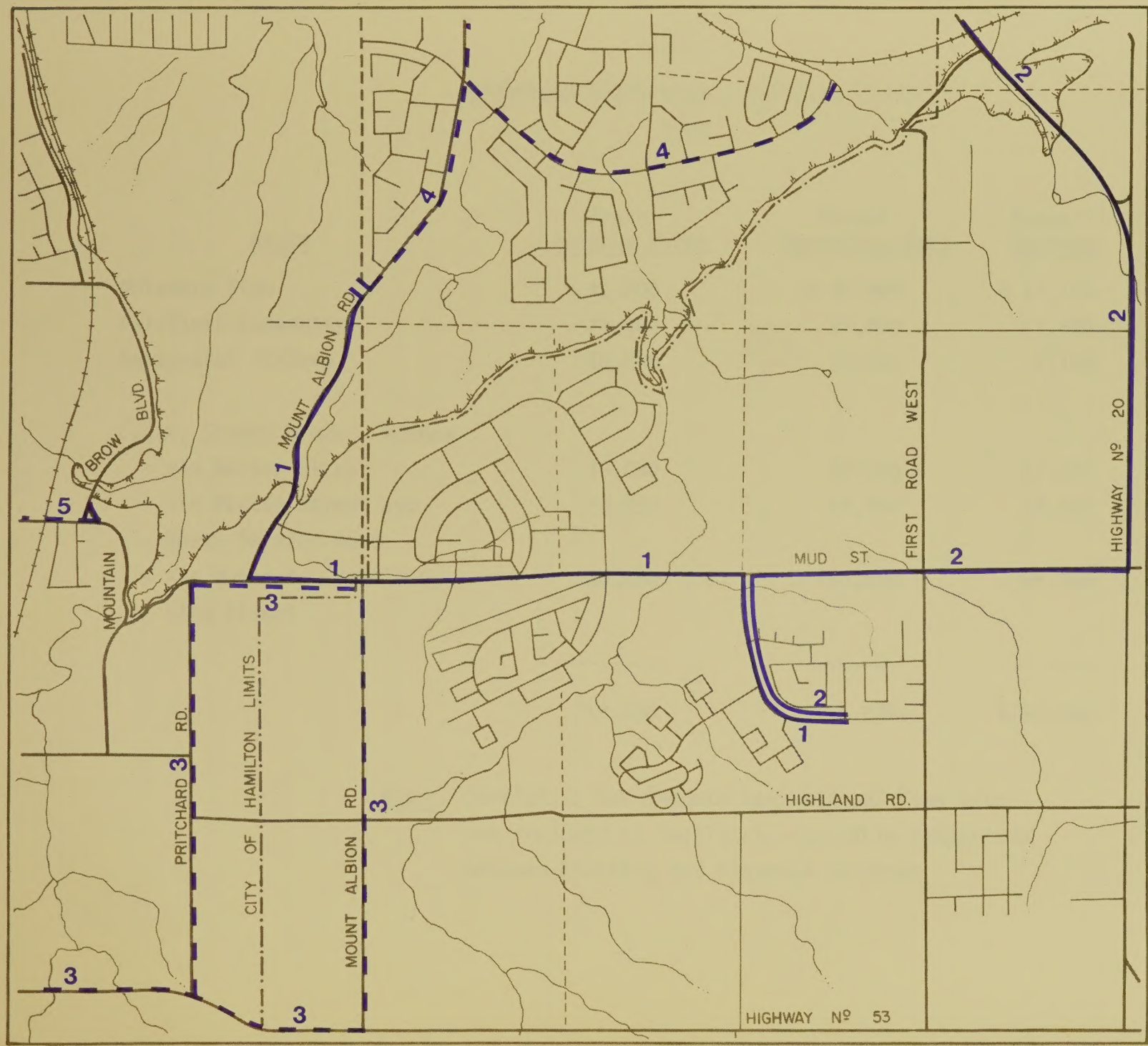

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SCALE IN FEET

1 Saltfleet Community
2 Centennial Parkway
3 Upper Ottawa Extension
4 Parkdale
5 Upper Kenilworth

EXISTING BUS ROUTES

Saltfleet Community

TOWN OF STONEY CREEK

PUBLIC TRANSIT INVESTIGATION

De Leuw Cather

Table 5

OPERATING STATISTICS - EXISTING SERVICES

1977

Route	Annual Revenue Miles	Annual Operating Cost	Annual Revenue	Revenue per Mile
Delaware Stub	42,700	$ 82,900	$ 17,100	$0.40
Saltfleet Community	28,500	47,800	1,800	0.06
Centennial Parkway	18,200	43,000	2,100	0.12
C.C.L. Stoney Creek - Winona				
- via Barton Street	43,000	86,400	57,500	0.98
- via Barton Street and North Service Road	27,000	54,300	12,500	0.46
- via Queenston Road and King Street	60,000	120,600	59,300	0.99
	219,400	$435,000	$150,300	

Note: Statistics for 9-month operation of King Stub not included to facilitate equitable comparison between Existing and Proposed Services

3. SERVICE AND FARE POLICIES

The need exists to formulate policy objectives for transit service within a community to ensure the planning of service changes is realistic in terms of what the community wants and can afford. Operating and financial policy essentially establish

- what constitutes a reasonable service to those citizens who are without access to an automobile for reasons of health, age or income;
- to what extent should the cost of operation be met from passenger revenue; and
- the amount of subsidy available from the community to support public transit services.

The suggested operating and fare policies outlined are based on current practice in other communities of similar size and the experience of the Consultant gained in the conduct of recent and similar studies.

3.1 THE ROLE OF PUBLIC TRANSPORTATION IN STONEY CREEK

A review of current ridership statistics for the transit routes serving Stoney Creek indicates the passenger volumes represent approximately 4 to 5 percent of the total daily travel demand. This corresponds with the experience of other communities in Ontario of comparable size. At this level of ridership, the transit system is providing primarily a public service function. The passenger volumes being developed do not affect the sizing of road facilities within Stoney Creek. Given the expected population and the dispersion of employment opportunities, public transit could not hope to provide the convenience offered by the private automobile. Any attempt to do so would not be efficient.

A further consideration in developing transit services within Stoney Creek is the relationship of this community to the remainder of the Region. Given its location adjacent to the City of Hamilton, Stoney

Creek cannot be considered to be a free-standing community in the transportation sense. This fact is underlined by the results of on-bus passenger surveys carried out in 1972 and 1977. The surveys indicated the majority of bus passengers are destined outside of the community. As a result, transit policy in Stoney Creek should recognize the need for integration of services with the City of Hamilton.

Public service will continue to be the major criterion in the determination of transit service policy in Stoney Creek within the short-term future. Minimum transit headways and hours of operation will be established more on the basis of public acceptance rather than demand. Consequently, given a predetermined level of service with an almost fixed ridership, the major area affecting the efficiency of the transit system is the cost of operation. The structure and staging of development in Stoney Creek will have a major effect on the operating cost of the selected system and this fact emphasizes the need for proper co-ordination of land development and roadway construction with the provision of bus services.

Based on the anticipated role of transit, the following objectives are appropriate for transit operation in the Town of Stoney Creek:

(i) provide an effective means of transportation for individuals who are without access to an automobile for reasons of health, age or income;

(ii) minimize the need for residents to purchase a second automobile;

(iii) be capable of responding to changes in demand, not only for regular transit service, but also for supplementary routes such as industrial and express operations;

(iv) be compatible with the transit services operated within the Region and particularly within the City of Hamilton; and

(v) ensure proper co-ordination between transit, land use, and roadway planning and staging in the community.

Operating policies are required to translate the broad objectives into actual service on the street. Minimum service policies ensure that the public service objectives are satisfied and that the planning of the system is realistic in terms of what the community wants and can afford.

3.2 SUGGESTED MINIMUM OPERATING POLICIES

Transit policies are not unchangeable. Adjustments will have to be made from time to time to reflect changing development patterns or in situations where public support indicates a change in the level of service.

The main areas of service policy are listed below. A suggested policy for each is outlined together with a general discussion.

1. *Area of Service - urban transit services will be provided within the area of the municipality located below the Escarpment to the east limits of the Town and the area above the Escarpment bounded by Mount Albion Road, the Escarpment, First Road West, and Highland Road.*

There are three broad areas of development within the municipality, i.e., urban, semi-urban, and rural. The boundaries of each category are listed below:

urban: below the Escarpment, between the west limits of the Town and Fruitland Road, and above the Escarpment within the area bounded by Mount Albion Road, the Escarpment, First Road West, and Highland Road (75 percent of population - population density of 3,940 persons per square mile)

semi-urban: below the Escarpment, between Fruitland Road and the east limits of the Town (11 percent of total population - population density of 450 persons per square mile)

rural: above the Escarpment within the area bounded by First Road West, the Escarpment, the south limit and the east limit of the municipality (14 percent of population - population density of 170 persons per square mile)

Within the urbanized area, regular transit services are warranted and can be supported because of the density of development. On the other extreme, no service is warranted in the rural area because of low population density. Further, the characteristics of the travel demand are not suited to public transportation. The remaining semi-urban area represents a transition between rural and urban. Similarly, the transit system should recognize this transition zone as requiring a reduced level of transit service.

2. *Service Coverage - within the urbanized area, the average walking distance to a bus stop will not exceed 1,000 feet where the road system makes such routings practicable. Maximum accessibility should be provided to the major commercial and institutional activity centres. Within the semi-urban area, the average walking distance will not exceed 1,500 feet where practicable.*

Most community transit systems provide service coverage based on a walking distance of 1,320 feet (1/4 mile). Recent surveys in other communities indicate most users live within 1,000 feet of the bus stop or approximately a 5-minute walk. This is the basis for suggesting 1,000 feet coverage in Stoney Creek where practicable.

3. *Hours of Operation - the period of transit operation should be related to the hours of major activity within the community. The minimum hours of service will be approximately 12 hours per day on all routes, Monday to Saturday, within the urbanized area. Service in the evenings, Sundays and holidays, should be set in relation to demand and consistent with financial guidelines.*

The suggested hours of service are comparable to communities of similar size. In the case of Stoney Creek, evening service may be desirable due to the inter-relationship with the activities in Hamilton. Service on Sundays and holidays are generally poorly patronized and are usually operated only in the larger urban areas.

4. *Frequency of Service - on all routes within the urbanized area, provide a minimum 30-minute frequency Monday to Saturday during the total hours of operation. Service will be increased where warranted by demand. On all routes within the semi-urban area, provide a minimum of three trips per day scheduled to accommodate morning, mid-day, and afternoon work, school, and shopping trips.*

Most communities under 50,000 population provide 30-minute service on all routes. Based on the current ridership, it is expected that some routes will operate at a 15-minute frequency during the peak periods, Monday to Friday.

5. *Transfers - the number of transfers required while travelling between two points in the community will be minimized for the convenience of the bus passengers. The suggested policy is as follows:*

   - *not more than two transfers are necessary between all points in the service area,*
   - *not more than one transfer is required between all points in the service area and the major traffic generators,*
   - *schedules will be co-ordinated between routes to minimize transfer delay, wherever practicable.*

The words 'wherever practicable' added to the schedule item reflect the operational problems of inter-connecting schedules.

6. *Planning - service will be introduced or changed only after proper investigation has been completed to forecast demand, revenues, and costs. In each case, a trial period should be established together with a ridership objective.*

7. *Public Information - comprehensive and current information on the transit services will be provided for the public. Sufficient advance notice will be given prior to major service or routing changes.*

3.3 FARE STRUCTURE POLICY

The transit system costs should be related to predetermined financial targets. These targets take into account the required levels of financial support to meet the social objectives set for the transit system while ensuring the financial support is realistic in terms of the Town's wishes and capabilities.

The various levels of public support in Ontario communities of similar size ranges between 40 and 60 percent of the total cost of operation. The average 1976 revenue/cost ratio of seven similar communities was 0.47. Stoney Creek, as part of a larger metropolitan area, should be able to achieve a revenue/cost ratio of 0.50. The estimated 1977 revenue/cost ratio for the present services is 0.38, excluding the C.C.L. inter-regional services.

A second consideration is the distribution of transit subsidy amongst the residents of Stoney Creek. There appear to be two options available:

(i) distribute the transit subsidy over the entire population. To our understanding, most Ontario communities follow this procedure principally because of the ease of administration.

(ii) distribute the transit subsidy to those residents within an established transit service area. This procedure is workable but would require additional administration work principally because the transit service area will change with the expansion of the transit service to accommodate future growth.

The method of allocating the transit deficits to the residents of the community is a policy decision. Major considerations include the ease of administration and flexibility of the formula to adapt to changes in the transit service over time.

The current fare structure for transit services varies within the proposed urbanized area of the Town. If a regular urban transit service is introduced, uniformity in the fare structure within the service area should also be established. One fare would be charged for travel within the local urban transit service area. An additional fare would be requested for travel into Hamilton based on the type of route selected. This arrangement is similar to current fare structure in the Town of Dundas. In keeping with the suggested revenue/cost target of 0.5, the following fare structure appears applicable and has been used in the revenue analysis developed later.

		To Hamilton	
	Local Service	Regular Service	Limited-Stop Service
Adult	35¢	50¢	60¢
Student	25¢	40¢	50¢
Child	10¢	25¢	35¢

The additional fare for travel into Hamilton assumes free transfer privileges to other regular H.S.R. services within the City of Hamilton.

If reduced fares for students, children and senior citizens are adopted, the fare policy should clearly identify and separate the costs of general support for regular passengers, support for education, and support for senior citizens.

Importantly, since the transit service is planned to be closely integrated with the remainder of the H.S.R. services, the fare structure adopted in Stoney Creek should be compatible with that used on the remainder of the system.

Based on the above discussion, the following is recommended as a desirable financial and fare structure policy:

- on a system basis, the fare revenue will recover at least 50 percent of the total cost of operation;
- where additional service is requested, the fare revenue will recover at least 50 percent of the marginal additional costs of operation;
- one fare will be charged for travel within the local urban transit service area; fares will be established consistent with the level of service provided. This would result in an additional fare for "limited stop" services and distance travelled on the system; and
- the fare policy will recognize the support given to students and senior citizens as a result of reduced fares. The subsidy to these groups of passengers will not be included in the transit operating deficit.

4. ASSESSMENT OF EXISTING SERVICE

One of the main purposes of the investigation was to determine the adequacy of the existing transit system in terms of service coverage, convenience of routing, capacity, frequency of service, hours of service, and service to industry. The intent was to evaluate the system, not only in terms of the existing population and development, but also its adequacy in meeting the needs of the residents within the short-term 5-year future. The evaluation process and the results are outlined in this section. Methods to improve the effectiveness of transit service are described in Section 5.

The evaluation procedure compared the present service to the desirable standards suggested under the proposed service policies. These are based on policies commonly accepted in the transit industry as well as the response of the users to the on-bus survey questionnaire. The present service has been evaluated under the following headings:

- service coverage
- convenience of routing
- hours and frequency of service
- comparison with other municipalities

All bus passengers were interviewed to determine where, when and why they used the service and how it could be improved. The methodology and results of the survey are documented in Interim Report 4 - ON-BUS PASSENGER SURVEY. Information derived from these surveys is given where appropriate in the evaluation of the present services.

4.1 SERVICE COVERAGE

Route coverage is a measure of the proximity of the bus routes to the population served. Very few people are willing to walk more than a quarter-mile to a bus stop. In a recent bus passenger survey in London, more than 80 percent of passengers lived within 5 minutes or 1,000 feet

of the bus stop. Consequently, the proportion of the population living within 1,000 feet of the present bus routes has been used as a measure of the service coverage.

The present coverage provided by the existing service is poor. If the projected 1978 population is realized, the population within a reasonable walking distance will be less than 35 percent of the total population within the urban area.

This assessment is supported by the results of the on-bus passenger survey. In general, the useage within the built-up area is low; less than 1/3 of the average for the City of Hamilton. The coverage provided by the present service is a contributing factor as walking distance was considered an important feature of transit service by over 50 percent of present users.

In the Former Town, there is a limited opportunity to improve the coverage because of the existing street system. The proposed street system inside the residential cells formed by the arterial roads also appears discontinuous. In order to provide acceptable coverage of the proposed development areas, the transit service will have to operate inside the cells formed by the major north - south and east - west arterial street grid.

Within the semi-urban area, east of Fruitland Road, the routes are operating along the most effective routings while maintaining a reasonable directness of routing. No deviation from the present routings would achieve a measurable improvement in coverage in this area.

4.2 CONVENIENCE OF ROUTING

The features considered in assessing the convenience of the present route network include the travel patterns of the present passengers, travel time, and the need for passengers to transfer to reach their destination. The on-bus passenger survey provided the necessary inform-

ation to determine how well the existing routes satisfy the desired travel patterns of existing riders.

It is clear from the survey that the activity centres located in the City of Hamilton are the major destination points of transit trips from Stoney Creek. Fully 68 percent of all bus trips relate to the City of Hamilton. As a result, the route pattern developed should provide as direct and attractive service as possible to this area, particularly between Stoney Creek and the C.B.D. of Hamilton. The directness of the present routing system is oriented towards the City of Hamilton and appears convenient for the majority of passengers. However, the directness of routing to major activity areas such as the commercial area of Stoney Creek and Eastgate Square should be improved.

All of the regular urban transit routes exhibited a reasonable level of transferring with the exception of the Delaware Stub. In the development of a routing system, this deficiency should be removed if possible. The transferring from the C.C.L. to the H.S.R. services are within reason. It would be difficult to reduce this and we do not see any potential to minimize the number of transfers between the two systems.

Travel time is an important feature in attracting greater use of the system. Of the total trips generated by Stoney Creek residents, approximately 40 percent of the total ridership use the C.C.L. routes. The average fare on the C.C.L. compared to the H.S.R. is 35¢ greater with no transfer privileges. It appears one of the major reasons for choosing C.C.L. over H.S.R. service is the reduced travel time. From Lake Avenue and Queenston Road, the time saving is approximately 15 minutes using the C.C.L. service. We recognize the difficulty in drawing this conclusion as not all residents have access to both services; however, it does appear that a large number of passengers are prepared to pay significantly more to obtain this travel-time saving.

No major areas of delay were identified in the review of the present routing

system. The traffic congestion within the Town is limited, parking conflicts are minimal and no other areas such as railway crossings are a factor in the operation.

4.3 HOURS AND FREQUENCY OF SERVICE

The major deficiency regarding hours and frequency of service within the urban area is the lack of consistency. The frequency and hours of service operated on the King Trolley is predicated on the service requirements further west. However, the service on the three other routes lacks consistency in the level of service provided. The uniformity of service within a system is important, not only in terms of equity to the residents, but also in relation to the accessibility of the user to the entire system. In addition, the Saltfleet Community and Centennial Parkway routes operate at less than the suggested hours and frequency of service.

The fluctuation in daily passenger traffic was tabulated from the survey information. The fluctuation in demand is typical of most urban transit operations exhibiting high peaking during the morning and afternoon rush hours. However, no capacity deficiency is apparent on any of the routes or segment of routes surveyed.

4.4 COMPARISON WITH OTHER MUNICIPALITIES

While no community can be expected to exactly duplicate the requirements of Stoney Creek in terms of its bus service, it is useful to make some general comparisons to highlight major differences in the level of service provided. The present system statistics in Stoney Creek are compared with seven other communities in Table 6.

The deficit of the present transit services charged to the Town of Stoney Creek would total approximately $153,000 in 1977 costs. This figure is slightly less than the amount charged in 1977 as no deficit will be assigned to the Town for the extension of the King Trolley which

replaced the King Stub. The average cost per capita for the urbanized population is approximately $6.70. This compares with an average cost per capita in seven other Ontario communities of $7.00 per capita. We therefore suggest that $6.00 to $7.00 per capita, or a total annual operating deficit ranging between $205,000 and $240,000 in 1977 costs be used as a guideline in developing a transit service assuming an urban - semi-urban population of approximately 34,000 for the planning period.

Ridership in Stoney Creek is slightly below the average of the other communities listed. While the level of service provided is lower than other communities, its location adjacent to Hamilton should encourage higher than average transit useage. On balance, with the provision of improved routings and schedules, an annual rate of 30 transit trips per capita can be anticipated.

Table 6

COMPARATIVE PUBLIC TRANSIT STATISTICS - 1976
SIMILAR ONTARIO COMMUNITIES

		Other Ontario Communities							
	Stoney Creek	A	B	C	D	E	F	G	Average*
Population (1975)	30,400	26,850	26,100	37,800	24,940	33,400	23,900	35,100	29,727
Annual Revenue Miles	219,400**	254,599	324,564	-	352,217	305,487	156,377	393,200	297,741
Annual Passengers	-	435,492	573,603	-	772,411	672,318	586,739	1,193,944	705,751
Annual Cost	$435,000	$274,938	$294,568	$474,430	$488,681	$428,249	$207,516	$565,119	$390,500
Fare Revenue	$150,300	$119,673	$103,839	$197,967	$199,461	$188,249	$112,841	$358,360	$182,913
Operating Deficit	$152,600	$155,300	$190,700	$276,500	$289,200	$240,000	$ 94,700	$206,700	$207,586
(per Capita)	$6.70	$5.78	$7.31	$7.31	$11.51	$7.19	$3.96	$5.89	$6.99
Annual Transit Trips per Capita	12***	16	21	-	31	21	25	34	24

*Excludes Stoney Creek
**Excludes King Trolley Extension
***Based on urbanized population of 22,800

5. DEVELOPMENT AND EVALUATION OF ROUTING CONCEPTS

The various route and scheduling changes considered to increase the effectiveness of the present service and to accommodate the needs of the anticipated development within the 5-year period are described in this section. These were developed based on the results of the evaluation of the adequacy of the present service.

5.1 GENERAL DISCUSSION

The analysis of the present services indicated scope for improvement in the following:

(i) establish a uniform service schedule on all routes operated within the urbanized area;
(ii) extend the routing system to the proposed residential development and provide service coverage compatible with the suggested standard of 1,000 feet; and
(iii) improve the directness of routing between Stoney Creek and the major attractors of transit trips to reduce transit travel time and minimize transfer inconvenience.

In our opinion, to achieve the improvements listed above requires that the following features be incorporated into a transit system operated in the urbanized area below the Escarpment:

- as much as feasible, provide full integration with the transit system operated in the City of Hamilton;
- continue the operation of semi-express services to minimize the transit travel time from Stoney Creek to the Hamilton C.B.D. during the peak periods; and
- develop a local radial network focused on one major terminal point. Grid or loop configurations are best suited to larger urban areas where the very frequent

service enables schedules to inter-connect at a number of major transfer points without a lengthy waiting period.

With the introduction of regular transit services in the area east of Gray's Road to Fruitland Road, adjustments to the C.C.L. operation will be required to avoid duplication and competition between the services. In addition, any changes must recognize the possible effects on the passenger loadings on the C.C.L. inter-regional operations. The local and inter-regional services of C.C.L. are not independent of each other and care must be taken in adjusting the local services to ensure that the inter-regional operation is not adversely affected.

The Saltfleet Community development has been treated separately from the area below the Escarpment in developing a transit service. Current ridership is quite low and perhaps consistent with the level of service offered. The limited operation based on the frequency and hours of service and the directness of routing offered is not consistent with the suggested minimum service policy. We believe a complete service should be offered to residents to establish the support for transit services in this development. After a suitable trial period, if the patronage has not shown a definite increase, the services should be rationalized consistent with demand. A minimum trial period of six months is recommended.

A final general comment relates to the potential of transit service to the industrial area located north of Barton Street. Experience with the provision of transit service to this type of development has been discouraging in the past. In a community of this size, it is difficult to provide an attractive service consistent with the demand. Further, the transit service is in direct competition with convenient, free employee parking. Consequently, there is little if any deterrent to the use of the private automobile.

5.2 DESCRIPTION AND EVALUATION OF ROUTING OPTIONS - URBAN AREA BELOW THE ESCARPMENT

Two basic routing systems for the urban area below the Escarpment were prepared. The anticipated short-term revisions and improvements in the street system have been incorporated into the proposals. In each routing concept, service to the Lakeshore Neighbourhood development north of the Q.E.W. is common in both options. Similarly, the service costed for operation east of Fruitland Road along Barton Street and the North Service Road is identical in both concepts.

The Queenston Road corridor east of Fruitland Road to the easterly limit of the Town appears to be adequately serviced by the present C.C.L. inter-regional routes. The passenger loadings are quite light. The number of local C.C.L. trips operated east of Fruitland Road along Queenston Road total 3 round-trips daily. We suggest discontinuing these trips as the number of passengers will not adversely affect the inter-regional operation while reducing annual operating costs.

Concept 1 - Urban Area Below The Escarpment

This routing system consists of four routes primarily focused on Eastgate Square. The round-trip mileage, operating speed and frequency of service is summarized in the following table and the routing system is illustrated in Figure 7.

	Route	Round-Trip Mileage		Scheduled Speed (m.p.h.)		Frequency of Service (Minutes)	
		Peak	Off-Peak	Peak	Off-Peak	Peak	Off-Peak
1	Millen Rd.- Queenston Rd.	13.2	13.2	13.2	13.2	15	30
2	Mohawk	19.8	6.5	13.2	13.0	15	30
3	Lakeshore	7.3	7.3	14.6	14.6	30	30
4	Barton - North Service Rd.	26.9		17.9		3 trips per day	

The operation of the "limited stop" service during the peak period would

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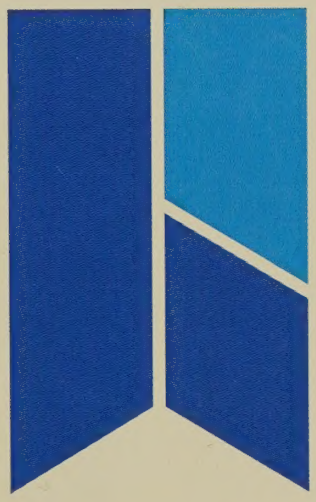

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be limited to one route, Route 2. During the off-peak period, Route 2 would terminate at Donn Avenue and Queenston in the vicinity of the proposed shopping centre and the King Trolley loop. The intent is to continue to provide "limited stop" service from Stoney Creek to the Hamilton core area while minimizing the cost of providing this type of operation.

Concept 2 - Urban Area Below The Escarpment

This routing system consists of five routes principally focused on the proposed shopping mall just east of Donn Avenue and Queenston Road. The principal route characteristics are summarized in the following table and the routing system is illustrated in Figure 8.

	Route	Round-Trip Mileage		Scheduled Speed (m.p.h.)		Frequency of Service (Minutes)	
		Peak	Off-Peak	Peak	Off-Peak	Peak	Off-Peak
1	Millen Rd.	6.6	6.6	13.2	13.2	15	30
2	Mohawk	19.8	6.5	13.2	13.0	15	30
3	Queenston	5.7	5.7	11.4	11.4	15	30
4	Lakeshore	6.1	6.1	12.2	12.2	30	30
5	Barton - North Service Rd.	26.9		17.9		3 trips per day	

The "limited stop" service provided in this concept is identical to that assumed in Concept 1.

In order to provide a common basis for the comparison of the two options, identical schedules regarding frequency of service and hours of operation were assumed for each alternative. The implication of extended hours of operation in the evening and/or reduced frequency of service is outlined at the conclusion of this report. For the purposes of the analysis of the two options, the following level of service was assumed:

Hours of Operation - 12 hours of service on all routes from approximately 6:30 a.m. to

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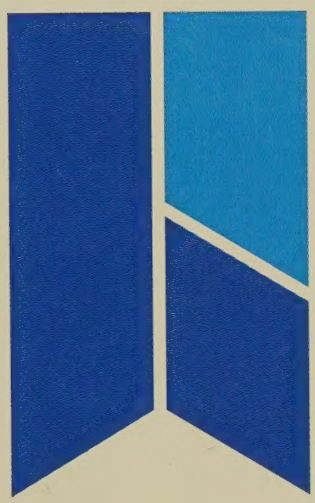

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6:30 p.m. Monday to Saturday. No service has been assumed on Sundays or holidays. The exception to this is the service operated along Barton Street and the North Service Road. Three round-trips each day Monday to Saturday have been costed for this route.

Frequency of Service - On those routes operated within the urban area, 15-minute service has been assumed during the peak period and 30-minute service during the remainder of the day. The exception to this schedule is the route operating through the development in the Lakeshore Neighbourhood. A flat 30-minute service has been costed on this route during the total period of operation. The area through which this route will operate is not as densely developed as the remainder of the urban area. Consequently, a 15-minute service does not seem warranted.

The estimated cost and revenue for each of the alternatives are summarized in Table 7. The cost estimates are based on an average unit cost of $1.90 per revenue mile. This unit cost is representative of 1977 H.S.R. urban transit operations.

The two options were compared under the following aspects of service:

(i) accessibility of residents to the transit system
(ii) level of service related to frequency of service and hours of operation
(iii) operational characteristics
- operating speed
- directness of routing

- transfers

(iv) cost and revenues

Service Coverage

Since the two routing options were developed to provide 1,000 feet coverage of the urbanized area, there are very minor differences in terms of service coverage. The major difference between the proposed systems and the existing system is the improved coverage afforded to the development area east of Gray's Road. The accessibility of residents living between Queenston Road and Barton would be substantially improved with the provision of a transit routing inside this residential land cell.

Level of Service

Both routing options were costed under a common assumption in regard to hours of operation and frequency of service. The assumed policies establish a regular urban transit service comparable to other communities of similar size in Ontario.

The provision of this level of service in combination with the coverage criteria represents the major difference in cost compared to the present services. However, as development continues to take place, the present services will have to be expanded. The difference in cost between an upgraded system based on the present routes and the options developed in this investigation would diminish markedly.

Operational Characteristics

The scheduled operating speed for each route within the two concepts range between 11.4 m.p.h. and 14.6 m.p.h. Higher operating speeds are possible on the route serving the Lakeshore area due to the sparseness of development along a portion of the route. We are confident these schedules can be maintained. However, these assumed operating speeds represent an upper limit. The routes outlined will be difficult to extend further without affecting schedule adherence.

Table 7

ESTIMATE OF COST, REVENUE, AND MUNICIPAL DEFICIT
ALLOCATION - SERVICE ALTERNATIVES FOR URBAN AREA BELOW THE ESCARPMENT

Item	Existing	Concept 1	Concept 2
. Annual Revenue Miles	172,700	312,400	295,300
. Annual Cost	$344,700	$593,600	$561,100
. Annual Revenue	$146,500	$260,000	$260,000
. Annual Deficit	$198,200	$333,600	$301,100
. Annual Subsidy	$ 64,500	$103,900	$ 98,200
. Annual Support			
- Town of Stoney Creek	$109,900	$205,500	$184,000
- City of Hamilton	$ 23,800	$ 24,200	$ 18,900
- Total	$133,700	$229,700	$202,900

The travel time from Stoney Creek to the Hamilton core area has been kept to a minimum by maintaining a "limited stop" peak period operation in both alternatives. Patronage for this type of service has been established on the present operation and it should be retained. The directness of routing provided under each option is good. Large loop routing has been avoided in order to minimize circuitous travel on the inbound or outbound trip. Transfers represent an inconvenience to the passenger and must be recognized as a deterrent to use. The results of the passenger survey indicated approximately 70 percent of the present users were destined into the City of Hamilton.

Seven percent of the total passengers were destined to Eastgate Square. As such, Eastgate Square represents the major attraction point adjacent to the Town. Under this factor, Concept 1 is considered superior as it reduces transferring to a minimum between Stoney Creek and the major trunk routes into Hamilton, and also for travel within the Town. Concept 2 would introduce a greater number of transfers by establishing two major focal points at the proposed shopping mall and Eastgate Square.

Cost and Revenues

The estimated annual cost difference between the two alternatives is approximately $32,500. However, the number of vehicles required and vehicle - hours operated under each alternative is identical. As labour costs represent almost 70 percent of the cost of operation, in effect the difference in annual costs of operation between both alternatives would be minimal. The difference shown is artificial and results from the method of estimation.

For comparison purposes, the per capita costs of operation for the two alternatives versus the present system are summarized below. The estimated per capita increase is approximately 45 percent.

Alternative	Annual Operating Cost per Capita	Annual Support per Capita
Existing System (based on 20,400 residents)	$16.90	$5.40
Concept 1 and Concept 2 (based on 26,400 residents)	$22.50	$7.80

The estimate of passenger revenue is difficult to determine and certainly there is no point in attempting to differentiate the estimates of passenger revenue for the two concepts. In our opinion, ridership on the routes proposed under Concept 1 would be higher solely on the projected reduction in transferring. However, the difference would be within the accuracy of the estimate of operating costs. As stated earlier, both alternatives are more costly than the present service due to the expanded level of service provided.

Based on the above evaluation, Concept 1 was selected as a guideline for the development of transit services within the urban area below the Escarpment.

5.3 DESCRIPTION AND EVALUATION OF ROUTING OPTIONS - SALTFLEET COMMUNITY

The alternatives considered for improving transit service in this residential development were as follows:

- upgrade the frequency and hours of service provided on the present Centennial Parkway route.
- extend an existing H.S.R. route into the Community. Several routes were reviewed. Of these, the Upper Kenilworth route appears to be the most feasible.
- develop a new east - west route along Limeridge Road with its eastern terminus in the Saltfleet Community. This could take the form of a route operating across Limeridge Road westerly to Upper James Street or a stub route operating from the end of the Upper Kenilworth route terminus at Mountain Brow and Limeridge Road.

The Consultant was directed to detail the extension of the Upper Kenilworth route and the stub route operation. The principal operating characteristics of these two options are summarized below:

Option	Round-Trip Mileage		Scheduled Speed (m.p.h.)		Frequency of Service (Minutes)	
	Peak	Off-Peak	Peak	Off-Peak	Peak	Off-Peak
Extension of Upper Kenilworth Route	20.5	20.5	13.7	12.3	15	20
Upper Kenilworth Stub	6.1	6.1	12.2	12.2	15/30	30

Because of the road system, the routing through the community is common in all options and assumes the provision of an exclusive transit link to improve the accessibility of the residents to the transit service.

The construction of this 800-foot two-lane roadway to urban standards would not exceed $115,000. In our opinion, the potential improvement warrants consideration. The potential disruption of implementation can be reduced considerably if implemented in the near future while residential construction is not fully completed. With this improvement, approximately 40 percent of the development can be brought within the desirable walking distance without increasing the cost of operating the proposed service.

The estimated cost and revenue for each of the alternatives are summarized in Table 8. The cost estimates were prepared based on an average unit cost of operation of $1.90 per revenue mile.

Similar to the evaluation completed for the transit options for the urban area below the Escarpment, the transit schemes developed for the Saltfleet Community were evaluated under the following headings:

(i) coverage
(ii) level of service

(iii) operational characteristics
(iv) costs and revenues

The routing through the community is similar under both options. The routing under the Upper Kenilworth Extension is marginally superior as it provides better coverage of the eastern part of the Felker Neighbourhood. Elsewhere, there is no difference in regard to this evaluation factor.

Level of Service

The extension of the Upper Kenilworth route provides a more frequent service in the off-peak. The frequency of service offered is predicated on the upstream demand and therefore, under this option, no flexibility exists to reduce the service frequency to the demand within the Saltfleet Community itself. The hours of service are also longer by approximately two hours each day for the same reason.

Operational Characteristics

The scheduled operating speeds under each alternative will ensure maintenance of the suggested schedule. The directness of routing provided is common; however, the "Stub" operation will require a transfer. The situation would be similar to the present Delaware Stub operation. Consequently, from a passenger convenience point of view, the Extension option is considered better.

Cost and Revenues

The schedules assumed under each option are relatively similar to allow a common basis of comparison. The evaluation is only valid if the generated demand warrants this level of service. Under these assumptions, the "Stub" operation is more economical by approximately $83,000 annually. Initially, it appears clear that the level of demand will not be sufficient to warrant a 15-minute frequency of service during the peak

Table 8

ESTIMATE OF COST, REVENUE, AND MUNICIPAL DEFICIT ALLOCATION - SERVOCE ALTERNATIVES FOR SALTFLEET COMMUNITY

Item	Existing*	Extension of Upper Kenilworth	Stub Route	
			15 peak - 30 off-peak	30 flat service
. Annual Miles	312,700	366,000	322,600	310,200
. Annual Cost	$599,200	$695,400	$612,900	$589,400
. Annual Revenue	$234,200	$256,200	$242,800	$239,400
. Annual Deficit	$365,000	$439,200	$370,100	$350,000
. Annual Subsidy	$104,900	$121,700	$107,200	$103,100
. Annual Support				
- Town of Stoney Creek	$ 42,700	$ 47,600	$ 51,800	$ 41,700
- City of Hamilton	$217,400	$269,900	$211,100	$205,200
- Total	$260,100	$317,500	$262,900	$246,900

*Includes Upper Kenilworth, Saltfleet Community, and Centennial Parkway routes

period, and a flat 30-minute service should be considered during the total hours of operation. As stated earlier, the reduction in frequency can only be achieved through the operation of a "Stub" route. The cost implications are given in Table 8.

Based on the above evaluation, the following transit service is suggested for the Saltfleet Community:

- although the extension of regular H.S.R. service which would minimize passenger transfer inconvenience is ultimately desirable, an interim "Stub" route operation is suggested recognizing the limited present demand.
- construction of a roadway link as illustrated on the proposed routing plan is desirable and priority should be given to its construction.

6. THE SELECTED ROUTING SYSTEM

This section describes the various elements included in the selected routes and schedules. The annual operating and capital costs, passenger revenues, and annual municipal support are detailed. The section concludes with an implementation program outlining the routes and schedules suggested for introduction in 1978.

The selected service includes the routes and schedules described under Concept 1 in combination with a "Stub" route extension of the Upper Kenilworth route providing a 30-minute schedule within the Saltfleet Community. The basic service characteristics are included in Table 9. All routes would be in operation for 12 hours from approximately 6:30 a.m. to 6:30 p.m., Monday to Saturday. Service would be discontinued on Sundays and holidays.

6.1 FORECAST OF COSTS AND REVENUES

Table 10 summarizes the estimated 1977 costs and revenues for the selected service in comparison with the existing service.

The estimated costs of operation have been prepared using current H.S.R. unit costs and consequently represent realistic estimates. Estimates of passenger revenue are more difficult. Current ridership is approximately 12 annual trips per capita.

With an improved level of service provided, we believe the transit useage can be increased to a rate in excess of 30 annual transit trips per capita. Applying the fare structure outlined in Section 3 and allowing for the current useage of the system by Hamilton residents yields an estimated annual passenger revenue of $268,000. This estimate was predicted using the most reliable information available.

In summary, we believe the costs and revenue estimates are realistic and we are confident the suggested routing network will be capable of

Table 9

BASIC SERVICE CHARACTERISTICS - SELECTED SERVICE

	Route	Round-Trip Mileage Peak	Round-Trip Mileage Off-Peak	Frequency of Service (Minutes) Peak	Frequency of Service (Minutes) Off-Peak	Vehicles Required Peak	Vehicles Required Off-Peak
1	Millen Rd. - Queenston Rd.	13.2	13.2	15	30	4	2
2	Mohawk	19.8	6.5	15	30	6	1
3	Lakeshore	7.3	7.3	30	30	1	1
4	Barton - North Service Rd.	26.9				3 trips per day	
5	Saltfleet Community	6.1	6.1	30	30	1	1

handling the growth and expansion of the Town during the planning period.

6.2 COST SHARING

The total annual deficit of $409,600 has been allocated based on the formula adopted by the Regional Transit Commission and the current Provincial Transit Assistance Program.

Under the provincial formula, the Ministry of Transportation and Communications has established a revenue/cost target for municipal transit operations. The revenue/cost target for transit operations for communities in excess of 200,000 population is 0.65. In this case, the M.T.C. will subsidize 50 percent of the total deficit up to a maximum of 17.5 percent of the total operating cost. For estimating purposes we have assumed the maximum subsidy available. After the M.T.C. subsidy is applied, the remainder of the route deficit is apportioned amongst the area municipalities on the basis of the route - miles operated in each community. The application of the deficit sharing formula is summarized in Table 10.

In comparing the average cost per resident, the suggested service represents approximately a 20 percent increase. However, the level of service represented by revenue miles operated has increased 60 percent.

With the level of service provided by the selected service, the objectives established for urban transit have been satisfied and each resident within the urbanized area has been provided with a regular transit service comparable with other Ontario municipalities of its population.

6.3 IMPLEMENTATION PROGRAM

This section of the report outlines the action required, and an immediate implementation program for service adjustments in 1978.

Table 10

SUMMARY OF ESTIMATED COSTS, REVENUES AND DEFICIT SHARING - SUGGESTED SCHEME

Description: the routes and schedules as described under Concept 1 in combination with a "Stub" route providing a 30-minute service during the total period of operation

	Existing	Suggested
. Annual Revenue Miles	219,400	356,600
. Annual Cost	$435,000	$677,600
. Annual Revenue	$150,300	$268,000
. Annual Deficit	$284,700	$409,600
. Annual Subsidy	$ 76,700	$118,600
. Total Annual Support	$208,000	$291,000
- City of Hamilton	$ 55,400	$ 43,800
- Town of Stoney Creek	$152,600	$247,200
. Average Cost per Resident* of Stoney Creek	$6.70	$8.00

*Based on an existing urbanized population of 22,800 and an urbanized population of 30,900 within the planning period

The Town of Stoney Creek should formally adopt the desired policies to achieve the objectives for the transit service. The minimum policies for transit services given in Section 3 of this report are intended to assist local government in establishing these policy statements. The principal policy decisions relate to the following:

(i) adoption of the recommended routes as a basis for the development of a short-term transit system to provide guidance in the development and road improvement priorities

(ii) selection of the hours and frequency of service to be provided

(iii) adoption of a fare structure for use of the transit services offered

(iv) establishment of the method of allocating the municipal support for transit services to the residents of the Town of Stoney Creek

After these policies have been confirmed, the Town should select those services for immediate implementation and make formal application to the Regional Transit Commission for the introduction of these services. Once the requested services are specified, the operating details can be confirmed by the operator regarding timing of implementation, bus stop locations, and public information. The remainder of this section outlines a suggested program for 1978 - 79.

Initially, we suggest the following four routes be operated as illustrated in Figures 3 and 4.

(i) Millen Road route - this route extends from Eastgate Square south along Centennial Parkway to King Street, east along King Street to Millen Road and returning to Queenston Road via Millen Road, Royce Avenue and Kilbourne Avenue. During the off-peak period, this route would be interconnected with the Mohawk route.

(ii) Mohawk route - this route extends from Eastgate Square east along Queenston Road to Gray's Road, north on Gray's Road to Cedardale, east on Cedardale to Green Road, north on Green Road to Hemlock Avenue, east on Hemlock Avenue to Millen Road, south on Millen Road to Red Oak Avenue, north on MacIntosh Drive to Puritan Street to Barton Street, terminating at Mohawk College. During the morning and evening peak periods, the route would originate from Mohawk College and would operate "limited stop" between Eastgate Square and the downtown bus terminal similar to the present C.C.L. operation. During the off-peak period, this route would be interconnected with the Millen Road route.

(iii) Saltfleet Community - this route would extend east from the present terminus of the H.S.R. Upper Kenilworth route at Mountain Brow Boulevard and Limeridge Road along Mountain Brow Boulevard and Mud Street to Paramount Drive, south on Paramount Drive to the proposed road connection to Gordon Drummond Avenue, along Gordon Drummond Avenue to Sir Isaac Brock Drive, south on Sir Isaac Brock Drive to 1st Road West, and return to Sir Isaac Brock Drive via 1st Road West and John Murray Street.

(iv) Barton and North Service Road - this route would originate at the Hamilton Terminal and proceed east along Barton Street to Fifty Road, north on Fifty Road to the North Service Road to Gray's Road, south on Gray's Road to Barton Street and return to the Hamilton Terminal. Five round-trips per day would be provided on this route. The direction of the looping may require changing during the day depending on the passenger loadings.

The following frequency of service and hours of operation are suggested and have been assumed in preparing the cost estimates:

Route	Route Length (miles)	Frequency of Service Peak	Off-Peak	Hours of Operation
Millen Road	6.7	20	30	12 hours Monday - Saturday
Mohawk	17.9 (peak) 6.9 (off-peak)	20	30	12 hours Monday - Saturday
Saltfleet Community	6.3	30	30	12 hours Monday - Saturday
Barton St. - North Service Rd.	26.9			5 trips per day

The estimated total system operating costs, passenger revenue and deficits are summarized below. The costs were estimated based on 1977 unit costs.

Annual Operating Cost	$500,000
Annual Passenger Revenue	$180,000
Annual Deficit	$320,000
Annual Provincial Subsidy	$ 87,000
Total Municipal Support	$233,000
Stoney Creek	$213,000
City of Hamilton	$ 20,000

The costs given above are based on 12 months of operation. Realistically, the service adjustments cannot be introduced immediately because of present driver assignments. In addition, the operator will require sufficient lead time to prepare revised schedules and driver assignments. As a result, the earliest the revised services could be introduced will be in late August or September.

To account for continuance of the present services until August 1978 and for 1978 cost increases, the municipal support for transit services would

total $195,000. In 1978, the provincial government will subsidize local transit operations in Stoney Creek up to a level of 80 percent of 1977 costs or $130,000. Consequently, the actual budget requirement of the Town of Stoney Creek is estimated to be $65,000.

In addition to operating support of the adjusted services, initial start-up costs will be incurred for the following:

- bus stops, bus shelters, route advertising, and
- construction of a roadway link in the Saltfleet Community to allow proper coverage of the development. Preliminary estimates for this facility total $100,000. of which the Town of Stoney Creek will be responsible for 50 percent of the costs.

The suggested budget for transit operation is summarized below:

- local transit operating subsidy with 80 percent provincial grant accounted for	$ 65,000.
- inter-regional transit subsidy from the Town of Stoney Creek	$ 40,000.
- initial start-up costs, including road facility construction in Saltfleet Community	$ 85,000.
Total	$190,000.

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